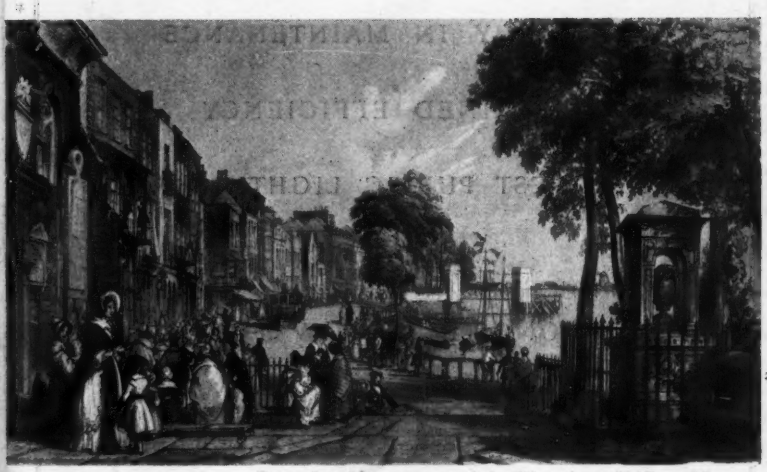
Light and Lighting

Vol. XLI.—No. 3 March, 1948 Price: One Shilling



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The March of Progress

Great changes have taken place in this Chelsea scene over the last hundred years and even greater changes in the lives of those who live there.

One of the most outstanding developments has been the growth of electric lighting. Accepted today as an integral part of our lives, it owes its remarkable progress almost entirely to the progressive co-operation of Members of the Electric Lamp Manufacturers' Association. As a result of the research carried out in their laboratories, the nation has been given more light of an ever improving quality, for a diminishing consumption of fuel.

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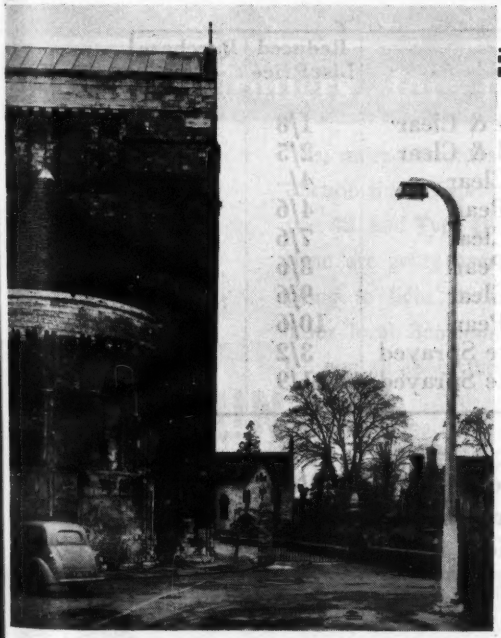
THE JOURNAL OF SEEING AND ILLUMINATION

G.E.C.

SODIUM STREET LIGHTING *at* ROMSEY



One of the G.E.C. lanterns outside Romsey Abbey.

The first section of the new lighting at Romsey is now installed and in service.

G.E.C. lanterns of die-cast light alloy with sealed prismatic refractors and OSRAM 140-watt Sodium lamps are used in this installation.

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200	Pearl	4/6	1/9
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500	Clear	9/6	—
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Incorporating "The Illuminating Engineer."

Official Journal of The Illuminating Engineering Society.

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CONTENTS

Natural or Artificial Light — or Both?

MANY interesting questions were raised at the I.E.S. Informal Meeting on February 24, when a discussion on the proposal "that good artificial lighting is an adequate substitute for natural lighting" took place.

We propose to give a summary of this discussion in our next number.

Meantime, it is well to remember that the actual *lighting effect* is only a part of the contribution of daylight to our ease, comfort and pleasure.

Windows serve not only to let daylight in but to allow us to see out. People are rarely at ease when daylight is completely excluded. Daylight factors, graphs, charts and calculations give no measure of the charm to the eye of views of flowers, trees or rivers by natural light, of distant mountains under changing conditions of cloud and sunshine.

Illumination Notes and News

Lighting and the Civil Service

A report entitled "Working Conditions in the Civil Service,"* prepared by a study group appointed by H.M. Treasury, contains a section on Lighting and Decoration. It is satisfactory to note that in this general survey illumination has not been overlooked, 16 pages being devoted to this subject.

Whilst there is nothing very novel in the report it does furnish an adequate review of existing knowledge. The advice given in regard to lighting is essentially sound, and is reinforced by a brief but useful bibliography.

Special interest attaches to the recommendations. Whilst emphasising the importance of good natural lighting—and a record of tests in Government headquarters reveals cases in which the lighting at only a short distance from windows was found to be very bad, or even negligible — the report points out the value of fluorescent lighting as a supplement when daylight is inadequate. It is suggested that for good natural lighting the depth of a room lighted on one side should not exceed 1¾ times its height; and of a room lighted from opposite sides four times its height.

In regard to artificial lighting 8-10 ft. c. for ordinary clerical work and higher values (unspecified) for close clerical work are recommended. The above values, whilst less than those recommended for continuous clerical work in the I.E.S. Code, are definitely higher than the present official standards (3-4 ft. c. average) in Government headquarter offices.

One is glad to see, however, that the report is not content with naming numerical values, but also stresses factors determining quality of lighting, such as limits to glare, soft shadows and a light style of decoration. A commendable feature is the series of illustrations, bringing out some useful points, such as the advantage of light colours for furniture and particularly for desk surfaces, as well as for walls and ceilings.

Whilst intended primarily for the Civil Service, these recommendations have, naturally, a general relation to office lighting. Instances of poor lighting conditions in Government buildings are reported—but there are doubtless many such in offices not concerned with official work.

* H.M. Stationery Office, 1947; 4s. net.

Next I.E.S. Meeting in London

On **April 13** a paper on **Photographic Illumination in Motion Picture Studios** will be presented by Mr. F. V. Hauser, Dr. F. S. Hawkins, and Mr. W. R. Stevens at a meeting of the I.E.S. to be held at the Lighting Service Bureau, 2, Savoy-hill, London.

The paper will deal with the methods of lighting film studio sets, and will discuss the intensity and spectral distribution of the illumination required. The properties of the various types of light sources available will be discussed in detail, and attention will also be given to power supply.

American I.E.S.: Annual Report

As usual, the annual report of the General Secretary of the American I.E.S. (Illuminating Engineering, December, 1947) makes interesting reading. A graph illustrates the spectacular rise in membership, which has been continuous after the short drop occasioned by the 1930 crisis. The latest figure, 5,665, shows an increase of over 700. The total income, now approaching 100,000 dollars, shows a corresponding increase. Sustaining members contribute rather less than a third of this substantial sum. Of this aggregate income, rather more than a third is allocated to salaries. It is instructive to note that, even now, the amount thus allocated (approximately 35,000 dollars) is more than the total income enjoyed by the British society.

The list of sections and chapters and the reviews of the work of committees and projects are impressive. The publication of the "Lighting Handbook" is naturally regarded as a highlight for the past year. Of special interest, also, is the work in progress relating to status and training in illuminating engineering. The first task before the committee is stated to be to "define an Illuminating Engineer"—certainly a rather formidable task, but one that can hardly be deferred much longer.

Architecture and Illuminating Engineering

The recent paper before a joint meeting of the I.E.S. and the R.I.B.A. by Mr. G. Grenfell Baines, reviewed in our last issue (February, 1948, p. 31), was of outstanding interest—if only for the fact that it gave I.E.S. members an opportunity of hearing the views of an architect. Lighting experts are always willing to hold forth to architects, but the latter have hitherto seemed somewhat reluctant to put their views forward.

The paper gave rise to a good discussion, some salient points of which are touched on elsewhere in this issue (p. 67). The author, in the time at his disposal, dealt very fairly and conscientiously with the various points put to him. Some of them obviously would bear much more discussion.

These joint meetings with the R.I.B.A. have now been a pleasant feature for a number of years and have had some useful repercussions—for instance, the joint demonstration-colloquy by Mr. R. O. Ackerley and Mr. Alistair MacDonald, which has gone on tour to the Centres with marked success on several occasions. We hope that both bodies will see that this annual joint effort goes on in some form, even if, as we gather, there may be some little difficulty in fitting it into future programmes on the present basis.

I.E.S. Summer Meeting

It is apparent from the response to the initial notices regarding the I.E.S. Summer Meeting that this event will be well attended both at the technical sessions and at the social events.

It is understood that the final notices will be circulated shortly. All members wishing to attend the meeting are asked to complete the form and return it to the Secretary of the I.E.S. As there may only be a limited number of places available for certain events, members are recommended to register and book their tickets for the various events without delay.

Those registering for the meeting will be able to take part in all the social events, for some of which no charge is to be made, in addition to being entitled to free admission to a number of entertainments in Harrogate during the period of the meeting. A further announcement in connection with the meeting appears on page 64.

Exhibition of Cleaned Pictures at the National Gallery

The Colour Group of the Physical Society recently had the privilege of being the first technical society to hold a meeting in the National Gallery when they went to view and discuss the exhibition of cleaned pictures. They were received by the Director of the Gallery and by the experts who were responsible for the cleaning of the pictures. The director explained that cleaning, i.e., the removal of discoloured varnish from old paintings, was no recent innovation. At various periods a number of pictures in the Gallery had been so treated. It was explained that the process depended on the fact that a mixture, of an appropriate strength, of acetone in white spirit would remove the varnish without affecting the underlying paint in any way, except for the removal of over-painting or retouching which had been carried out at a more recent period than that of the original picture.

The discussion was a very informal one, ranging over the cleaning process itself, its possible effect on the original work of the artist, the effect of backgrounds and framing on the appearance of pictures, the coloration of the varnish and the use of pigment in varnish by certain artists. Some members, noticing that the pictures were illuminated by warm-white fluorescent lamps, initiated a discussion on the effect of the light from these lamps on artists' colours. It was suggested that special lamps might be developed, possibly at reduced efficiency, with much better colour-rendering properties than the lamps now in commercial production.

Readers of *Light and Lighting* who have not yet visited the exhibition will find much to interest them. The photographs of certain pictures before and after cleaning, and the demonstration picture, cleaned over only a portion of its surface, are most instructive.

The Dazzle Problem

We notice that the Road Research Board of the D.S.I.R. has recently reported on the prevention of dazzle on roads. This is a problem that is always with us and on which many reports have been prepared. As yet no final and entirely satisfactory solution is suggested, though apparently research with this object is continuing. For the moment interim driving beams which do not rise above the horizontal and passing beams which are dipped at least 3 degrees are recommended. Furthermore, passing lamps should be mounted not higher than 3½ ft., but preferably not lower than 2½ ft. above the ground.

Photometry and the Eye

As we go to press we learn that a series of six lectures on the above subject is to be given at the Imperial College of Science (Prince Consort-road, South Kensington), by Dr. W. D. Wright. The lectures will take place on Tuesdays and Thursdays, commencing on May 25, and the fee for the course will be £1 1s. Applications for further particulars should be addressed to the Registrar of the Imperial College, at the above address.

New Illumination Design Course

Yet another illumination design course has recently been arranged by the Lighting Service Bureau of Scotland. This course, which opened in Falkirk last month, is the first of several courses in Scotland organised by Mr. C. J. King.

We also note that the next London Evening Design Course is due to open on April 5.

Forthcoming I.E.S. Meetings

(Provisional List)

MEETINGS AND VISITS IN LONDON

1948.

April 13th. Sessional Meeting. Dr. F. S. Hawkins, Mr. F. V. Hauser and Mr. W. R. Stevens on **Film Studio Lighting.** (*At the Lighting Service Bureau, 2, Savoy Hill, London, W.C.2.*) **6 p.m.**

April 27th. Visit to Pinewood Studios, Iver Heath, Bucks. **11.15 a.m.**
Visit to London Film Studios, Shepperton. **2 p.m.**

May 11th. Visit to Chislet Colliery.

June 16th-19th. Summer Meeting, Harrogate.

MEETINGS OF CENTRES AND GROUPS

1948.

April 2nd. Mr. H. G. Jenkins and Mr. J. N. Bowtell on **High Voltage Fluorescent Light Sources.** (*At the Electricity Showrooms, Bath.*) **7 p.m.**

April 5th. Annual General Meeting of the Leeds Centre, followed by an **Address** by the President (Dr. J. W. T. Walsh). (*At the Leeds Corporation Electricity Dept., Whitehall Road, Leeds.*) **6 p.m.**

April 6th. Mr. G. A. Jones on **Lighting for Photography.** (*At the Liverpool Corporation Electricity Showrooms, Whitechapel, Liverpool.*) **6 p.m.**

April 7th. Annual General Meeting of the Newcastle Centre and **Address** by the President (Dr. J. W. T. Walsh). (*At the Minor Durant Hall, Oxford Street, Newcastle-upon-Tyne.*) **6.15 p.m.**

April 8th. Mr. J. G. Holmes on **The Properties of Glass used in Lighting Fittings.** (*At the Lecture Hall, Brighton Municipal College.*) **7.30 p.m.**

April 8th. Mr. J. B. S. Smyth on **Highways Lighting.** (Special Meeting with Engineers of Local Government Authorities and Supply Companies.) (*At the Cardiff Corporation Demonstration Theatre.*) **3.15 p.m.**

1948.

April 8th. Mr. C. Hurd on **Lighting Maintenance.** (*At the Electricity Dept. Demonstration Theatre, Charles Street, Leicester.*) **6.30 p.m.**

April 8th. Mr. T. O. Freeth on **Lighting for Effect.** (*At the Corporation Electricity Offices, Sunbridge Road, Bradford.*) **7.30 p.m.**

April 9th. Mr. F. Widnall on **Mine Lighting.** (*At the Imperial Hotel, Temple Street, Birmingham.*) **6 p.m.**

April 9th. Mr. T. O. Freeth on **Lighting for Effect and Interior Decoration.** (Joint Meeting with the Electrical Association for Women.) (*At the Electricity Showrooms, Market Street, Huddersfield.*) **7 p.m.**

April 15th. Mr. H. R. Ruff on **New Lamps—New Uses and New Lighting Techniques.** (*At the Reynolds Hall, College of Technology, Sackville Street, Manchester.*) **6 p.m.**

April 26th. Dr. H. Cotton on **Colour of Discharge Lamps** and **Annual General Meeting** of Sheffield Centre. (*At the Medical Library, The University, Western Bank, Sheffield.*) **6 p.m.**

April 30th. Mr. T. O. Freeth on **Lighting for Effect.** (*At the Imperial Hotel, Temple Street, Birmingham.*) **7 p.m.**

April 30th. Dr. J. H. Nelson on **Colour and Lighting in Industry.** (*At the Electricity Showroom, Market Street, Huddersfield.*) **7 p.m.**

May 6th. Discussion on Mine Lighting followed by **Annual General Meeting** of Cardiff Centre. (*At the Treforest School of Mines.*) **3.15 p.m.**

May 7th. Address by the President (Dr. J. W. T. Walsh). (Joint Meeting with the Exeter Group.) (*At Radiant House, Bristol.*) **7 p.m.**

May 13th. Annual General Meeting of the Leicester Centre. (*At the Electricity Department Demonstration Theatre, Charles Street, Leicester.*) **6.30 p.m.**

(Secretaries of Centres and Groups are requested to send in particulars of any changes in programmes, mentioning subject, author, place, date and time of meeting: summaries of proceedings at meetings (which should not exceed about 250–500 *words) and any other local news are also welcome.)*

High Voltage Fluorescent Tubes

Summary of a paper read by Mr. H. G. Jenkins and Mr. J. N. Bowtell at the meeting of the Illuminating Engineering Society held in London on March 9, 1948.

Although high voltage fluorescent lamps with cold cathodes have been in use in this country for general lighting purposes since 1933, lighting engineers are probably less familiar with their characteristics and their possibilities than they are with those of the mains voltage fluorescent lamps, which were not developed until several years later. There is, however, scope for the use of both types of lamp, and where voltages higher than the usual supply voltages may be employed the lamp designer is able to use greater scope with regard to dimensions and gas filling, and the lighting engineer has more opportunity for expressing his own and his customer's ideas.

Cathode Characteristics

A cold cathode usually takes the form of a hollow metal cylinder, on which the discharge terminates, and which in operation reaches a temperature which is less than 200 deg. C. A hot cathode, on the other hand, usually comprises a relatively small spiral of a refractory metal, coated with an alkaline earth oxide, or containing a pellet of oxide within its coils. During normal operation the spiral is maintained at about 1,000 deg. C.

A considerable amount of valuable information is now available regarding the behaviour of various types of cathodes. It is clear from such data that the efficiency of the luminous column, i.e., the light-giving portion, of fluorescent tubes is independent of the type of cathode used. It is, however, determined by other factors such as mercury vapour or neon pressure and current density which affect the production of ultra-violet radiation. Mercury vapour pressure is a function of the tube temperature, which in turn depends on the tube loading. It has been shown that the optimum efficiency with fluorescent tubes is obtained at a wall temperature of 40 deg. C. With most types of low pressure fluorescent lamps burning in the open the lamps normally operate at about this optimum temperature. It is possible, however, by modification of the rare gas filling to ensure that the optimum efficiency is obtained at lower ambient temperatures, and the addition of neon to the usual argon filling gives better results outdoors or in cold situations.

Luminescent Materials

The phosphors used in low pressure mercury vapour and neon discharge lamps are prepared by firing the compound, or mixture of constituents, together with the activating metal if one is used, at a temperature of about 1,200 deg. C. for periods of from one to several hours. The finished powder comprises very fine crystalline particles. The luminiscent characteristics of the phosphor are determined partly by the crystalline compound, or matrix, and partly by the activator.

The common characteristic of phosphors in normal use is that they are all excited by the mercury ultra-violet line at 2537A. In certain cases the excitation band extends down to very short wavelengths in the region of 700A, which is just below the wavelength of strong ultra-violet lines in the neon discharge.

The light from each phosphor is generally markedly coloured, and to obtain a spectral composition suitable for general lighting it has been necessary in the past to mix the light from two or more powders. Sometimes this is done by mixing the light from two or more different coloured tubes. The more usual practice is to mix the component powders in a single tube in the right proportions to give the required spectral composition.

The discovery of a new series of phosphors has made it possible for the first time to obtain white light from a single powder. By varying the composition of the matrix, the amount of activators present, and the method of manufacture, a range of colours from pale blue to pink and orange, and including a range of white colours, can be prepared.

Post-war Practice

The widespread use of mixed powder coatings in mains voltage lamps naturally created a demand for similar colours

in high voltage tubes, and improvements in powders and lamp processing methods have made possible greatly improved efficiencies. The demand for increased light output from the tubes has been met by almost doubling the electrical loading of pre-war mercury tubes but even so the life of tubes is in the order of 10,000 hours. The higher loading permits a much higher lumen output per unit length of tube, an important consideration at the present time, though some of the advantages of low brightness have had to be sacrificed. The electrical and photometric characteristics of modern neon filled tubes are substantially the same as for pre-war tubes; the loading of these tubes cannot be materially increased without spoiling their colour.

The method of operation using leakage reactance transformers which was in use before the last war is still in use for "tailor-made" lighting installations. Lighting units comprising three straight standardised lighting lengths are operated from two transformers connected in tandem. This method is possibly more expensive than a single transformer method but the smaller size of the transformer enables them to be placed inside the end boxes which also house the tube electrodes and the capacitors for power factor correction. High tension wiring is thus eliminated and the unit is self-contained.

A different application of cold cathode tubes is to critical industrial colour matching. A special colour matching unit has recently been introduced, the spectral energy distribution of the light from which closely corresponds to that of an overcast north sky and which was decided upon after consultation with users in various branches of industry. The good lumen maintenance characteristics of plain unactivated cold cathodes is of great importance for this application as it leads to constancy of colour rendering throughout life. Uniformity of colour rendering from tube to tube, which is of particular importance, is achieved by special care and individual testing of each tube during manufacture.

Production of Warm Light

It is possible to increase the warmth of the light of mercury filled fluorescent lamps by adjusting the composition of the fluorescent coating. Unfortunately, however, deep red light cannot be added without serious loss of efficiency. The present mercury warm white colour probably represents as good a compromise between warmth of colour and efficiency as is possible at the present time with this type of source.

For many fluorescent lighting applications, in restaurants for example, a light warmer than the present mercury filled warm white is sometimes needed to give good rendering of deep red colours without too much purple distortion of blue colours. Neon fluorescent tubes in combination with ordinary mercury filled white tubes can be used very effectively for such applications. The neon discharge provides the deep red radiation which is desirable for rendering the colour of the human skin in a pleasing manner. The light output of neon tubes does not depreciate during life as with mercury filled tubes. This gives rise to a slight change in the composition of the light from these units as the tubes get older, the tendency being for the light to become slightly warmer. In practice it has been found that this change is of little importance.

Attractive warm lighting effects can be obtained by using neon fluorescent tubes as decorative features in tungsten or mercury fluorescent lighting schemes, the efficiency of these tubes being four or five times that of filtered tungsten light of the same general quality. Owing to their distortion of blue colours, however, these sources are hardly suitable for use alone. This defect has been overcome to some extent in a new type of neon tube using a fluorescent coating which emits blue as well as green light. The colour appearance of the tube is salmon pink and the colour rendering of blues is greatly improved. Sources of this type have so far been used only in experimental installations.

The importance of the careful choice of colour in decorating interiors is not fully appreciated and perhaps not enough attention has been paid by illuminating engineers to the possibility of coloured lighting. Cold cathode tubes, on account of the wide range of coloured sources available and other special features, are peculiarly adapted to the more colourful and decorative forms of lighting.

National Illumination Committee of Great Britain

(Affiliated to the International Commission on Illumination)

ANNUAL REPORT FOR THE YEAR 1947

(Presented at the Annual Meeting of the Committee held on Friday, January 30th, 1948)

It can now be said that the Committee has resumed its normal activities, most of which have during the year been concerned with preparations for the meeting of the International Commission on Illumination to be held in Paris early in July, 1948. Several more Sub-committees have been reconstituted, and the progress made by these and the others already functioning can be summarised as follows:

1*a*. *Vocabulary* (Secretariat-Switzerland). The Committee has appointed Dr. Walsh as the representative on the I.C.I. Working Committee on Vocabulary, in preparation for a meeting as suggested by the Secretariat. The B.S.I. Technical Sub-committee has recommended that illumination should be expressed as "lumens per sq. ft.," with "foot-candles" as a permitted alternative.

1*b*. *Definitions and Symbols* (Secretariat-France). A memorandum has been prepared for consideration by the Committee.

4. *Light and Vision* (Secretariat-France). A questionnaire has been received and a reply, which included a bibliography, has been sent.

5 and 6. *Photometry* (Secretariats-France (Visual) and Switzerland (Physical)). This Sub-committee has been re-formed under the chairmanship of Mr. G. T. Winch. Two questionnaires have been received and replies have been sent.

7. *Colorimetry* (Secretariat-U.S.A.). A Sub-committee has been formed with Dr. W. D. Wright as chairman. A questionnaire has been received and answered.

21. *Light Sources* (Secretariat-Great Britain). Replies to a questionnaire have been received from Belgium, Holland, and the U.S.A. and the Secretariat report has been drafted.

22*a*. *Diffusing Materials* (Secretariat-Czechoslovakia). A bibliography has been compiled and copies of the papers sent to the Secretariat.

22*b*. *Classification of Light Distributions* (Secretariat-Belgium). The B.S.I. have prepared a specification on this subject. A short questionnaire has been received and answered by the B.S.I.

23*a*. *Street Lighting* (Secretariat-U.S.A.). A Code of Practice is to be prepared to replace the Specification. A questionnaire has been received and the B.S.I. have almost completed a reply.

23*b*. *Automobile Lighting* (Secretariat-Italy). A request for information has been received from the Secretariat. The International Standards Organisation is now proceeding to deal with the standardisation of all matters relating to automobiles. Two international meetings have already been held, at which Dr. Nelson, the chairman of the N.I.C. Sub-committee, was present.

25. *Museum Lighting* (Secretariat-France). A questionnaire has been received and a reply sent.

26*a*. *Aviation* (*Ground*) *Lighting* (Secretariat-Holland). A questionnaire has been received and has been referred to the B.S.I.

26*b*. *Aircraft Lighting* (Secretariat-France). At the suggestion of the Committee, an approach was made by the Central Bureau of the I.C.I. to the International Civil Aviation Organisation (I.C.A.O.), which is the recognised international body dealing with aviation lighting generally. The reply indicated that the National Committees of the I.C.I. could be of considerable assistance to I.C.A.O. A Sub-committee on this subject is therefore being formed, but at present the extent of its future activities is uncertain, in view of the fact that in this country all matters relating to air-

craft come under the direct jurisdiction of a Government Department.

26c. *Traffic Signals* (Secretariat-Great Britain). A request for information has been circulated to other National Committees.

26d. *Calculations on Projector Systems* (Secretariat-Great Britain). The B.S. has been modified somewhat and a schedule on lighthouse lamps has been drafted. A request for information has been circulated to other National Committees.

27. *Natural Daylight* (Secretariat-Great Britain). Most of the replies to a questionnaire have been received and a report has been drafted.

29. *Mine Lighting* (Secretariat-Belgium). The report previously prepared has been circulated to National Committees.

41. *Ultra-violet Light* (Secretariat-Holland). A request for information has been received from the Secretariat.

62a. *Lighting Education* (Secretariat-France). Professor MacGregor-Morris has resigned from the Chairmanship of this Sub-Committee and his place has been taken by Mr. F. C. Smith. A questionnaire has been received and answered.

62b. *Lighting Practice* (Secretariat-U.S.A.). A considerable amount of data has been collected, but the receipt of a questionnaire is still awaited.

62c. *Voltage Variations* (Secretariat-Italy). A request for information has been received from the U.S. National Committee, who forwarded U.S. literature on the subject.

62d. *Cinema Lighting* (Secretariat-U.S.A.). A Sub-Committee, with Mr. H. C. Weston as Chairman, has produced a report which has been sent to the Secretariat.

62e. *Theatre Stage Lighting* (Secretariat-Great Britain). Replies to a questionnaire have been received from Belgium, Czechoslovakia, France, Germany, Holland, and Italy, and one is awaited from the U.S.A.

A special Sub-committee was appointed to consider a Ministry of Home Security Report on Luminescent Materials, but the Committee finally decided not to take up the study of this subject.

Copies of Volumes I and II of the 1939 Proceedings of the I.C.I. have been received and distributed to members and to University and College Libraries. These volumes, which include Secretariat Reports and individual papers respectively, were printed in Vienna early in the war and were later retrieved and received by the Central Bureau. Volume III, dealing with the 1939 meetings, will be printed shortly.

It is with considerable regret that the Committee has to record the death of Prof. T. David Jones, who has been one of the representatives of the Illuminating Engineering Society for several years. Resignations have been accepted with regret from Dr. Buckley, after a membership of 24 years (17 as Secretary), and Dr. Dudding, after 20 years. These vacancies have been filled by the nominations of Mr. L. J. Davies and Dr. J. H. Nelson by the Illuminating Engineering Society, and of Dr. S. English by the Society of Glass Technology.

The Air Ministry is now represented by Air Commodore G. I. L. Saye and Mr. C. Heyes, in place of Messrs. Collins and Dalgleish, whilst Messrs. Mortimer and Pearse, of the Ministry of Civil Aviation, have given place to Messrs. D. Parker and R. J. Broughton. The Electric Lamp Manufacturers Association has now nominated a second representative in Mr. E. B. Sawyer, and the Incorporated Municipal Electrical Association have replaced Mr. Eccles by Mr. R. Birt. Mr. W. R. Edgar has been nominated as one of the representatives of the Society of British Gas Industries in place of Mr. Stevenson.

The representative on the Executive Committee of the I.C.I. is now Mr. F. C. Smith, in place of Dr. Buckley.

It is appropriate to mention that the new unit of luminous intensity, the " new candle," based on the radiation from a black-body radiator at the temperature of the solidification of platinum, is being introduced on January 1, 1948, at the same time as the change from international to absolute electrical units is being made.

J. W. T. WALSH,
Chairman.

(The constitution of the Committee is given on the following page.)

Constitution of the National Illumination Committee on December 31st, 1947.

NOMINATED BY THE CONTRIBUTING ASSOCIATIONS:—

Illuminating Engineering Society: P. V. BURNETT, L. J. DAVIES, J. S. DOW, L. H. MCDERMOTT, DR. J. H. NELSON.

Institution of Electrical Engineers: R. O. ACKERLEY, P. GOOD, PROFESSOR J. T. MACGREGOR-MORRIS, SIR CLIFFORD PATERSON, J. W. TOWNLEY.

Institution of Gas Engineers: A. M. BELL, J. E. DAVIS, A. G. HIGGINS, W. HODKINSON, F. C. SMITH.

NOMINATED BY THE CO-OPERATING ASSOCIATIONS:—

Admiralty: H. A. L. DAWSON.

Air Ministry: C. HEYES, AIR CDR. G. I. L. SAYE.

Association of Public Lighting Engineers: E. J. STEWART.

British Electrical and Allied Manufacturers' Association: C. RODGERS.

British Electrical Development Association: V. W. DALE.

British Gas Council: A. M. BELL, D. CHANDLER.

Department of Scientific and Industrial Research: (*National Physical Laboratory*) T. SMITH, DR. J. W. T. WALSH; (*Building Research Station*) W. ALLEN.

Electrical Contractors' Association: C. J. VENESS.

Electric Light Fittings Association: G. CAMPBELL, DR. S. ENGLISH.

Electric Lamp Manufacturers' Association: W. J. JONES, E. B. SAWYER.

Glass Manufacturers' Federation: DR. W. M. HAMPTON, G. MARCHAND.

Incorporated Municipal Electrical Association: R. BIRT.

Industrial Health Research Board: H. C. WESTON.

Institution of Municipal and County Engineers: E. J. ELFORD.

Medical Research Council: PROF. H. HARTRIDGE.

Ministry of Civil Aviation: R. J. BROUGHTON, D. PARKER.

Ministry of Health: A. SCOTT.

Ministry of Labour and National Service: E. W. MURRAY.

Ministry of Supply: BRIG. F. H. MACLENNAN.

Ministry of Transport: DR. H. F. GILLBE.

Ministry of Works: G. SMITH.

Post Office: DR. C. G. ROBERTS, W. T. GEMMELL.

Railway Clearing House: A. CUNNINGTON, E. MORGAN.

Society of British Gas Industries: W. R. EDGAR, R. J. ROGERS, P. C. SUGG.

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Representatives of Great Britain on the Executive Committee of the International Commission on Illumination:—

DR. J. W. T. WALSH and F. C. SMITH.

Lighting of Large Retail Stores

(Part III.)

By A. W. JERVIS

The following is the last of this series of three articles and deals with the design of lighting fittings and some views on future developments.

In a foreword to his latest book, Dr. J. W. T. Walsh says, "The final judge of any lighting system is the eye." To my mind, these words are the A to Z of lighting application and imply that, even if the theoretical calculations are correct, the installation will fail if it does not *look* right.

The responsibility for ensuring this rests, to a great extent (especially at the present time), on the type of fitting installed; it must be in tune with its surroundings to such an extent that it becomes merged into the background, or, as somebody recently described a scheme, "it gives unconscious lighting." What better testimonial could the industry have than this, that it did its job without a lot of fuss and bother.

To carry this out to its fullest extent would mean that the fittings must be specially designed for every job, a position that is almost impracticable to carry out, mainly because of the time and cost that would be involved. We must, therefore, have basic designs which are capable of minor modifications to meet the particular requirements.

These basic designs will vary with the individuality of different designers, and the total will provide a firm ground on which to build the variegated needs of the retail store. As to what constitutes a perfect design of fitting, I quite frankly do not know, and inspirations for the future come from mistakes of the past; this in itself raises a very vital factor where a lot of different stores are involved. That is, if we make progress in achieving the ideal fitting, each installation must be better than the previous, so that after a number of installations have been carried out a comparison between the most recent and the first is greatly to the detriment of the original scheme, a position that is not pleasing the earlier user, and as the cost of carrying out any large-scale lighting scheme at the present time is high, repercussions are apt to be felt, and one of the things a lighting engineer must never lose is the client's complete confidence.

Which brings us to the first thing necessary in modern fittings—that they should be adaptable to future trends. I have found that a good way of ensuring this is to plan the scheme regardless of present restrictions and then divide the work into two parts, that which can be done now and that which can be added at some future time. This also ensures that the scheme will be kept in the forefront of modern progress and able to take advantage of any technical improvements.

With any type of fitting thought must be given to the overall weight. This question is not the least of the present problems connected with fluorescent lighting, for, owing to the length of the light source, the area to be screened is large, and this added to the weight of the control gear means that special consideration must be given to the methods of fixing, not merely in making the supporting bolts (or screws) strong enough, but also allowing for the erection in easy stages *and* access to the wiring after the fitting is installed. Use of aluminium extruded moulding has been found beneficial in not only limiting the weight but also in lending itself to mass production.

Whether the fitting will be made entirely of translucent material or of more concentrating pattern will depend on the requirements, but it has been found that louvre fittings, using aluminium, lend themselves to easy production, and their maintenance factor is high. Figs. 1 and 2 show a fitting suitable for a low mounting height, using multiples of 4 ft. lamps, in which the actual lamps are screened by a side strip of metal and the visual angle from below is broken by the louvres. The side strip of the fitting is composed of extruded aluminium which can be cut and mitred to form a light-weight frame, and which has ledges to take either louvres or glass shields. The important feature of a louvred fitting is the angle of cut-off. By experience this has been found to be best at approximately

Fig. 1. Modern louvred fitting for fluorescent lamps for use with low mounting heights.

35 degs. The efficiency of the fitting for downward lighting will be greater when the depth of the louvres is at a minimum.

The colour of the louvre surface has a direct bearing on the visual surface brightness, and as the efficiency of the lamps is increased this fact will have to be taken into consideration. Fittings, employing 4 ft. lamps, can have a "whiter" louvre than those using 5 ft. lamps. The next step in louvre finishes will, I think, be straw colour, but there is a wide field for investigation on the effects of different coloured louvres to give varying atmospheric appearances. The flare of the type of fitting shown in Fig. 1 is a simulation of a cornice effect and what might be obtained if the lighting were placed at the central point between the bays on a ground floor scheme (see Fig. 5).

Fittings using the 4 ft. lamps have

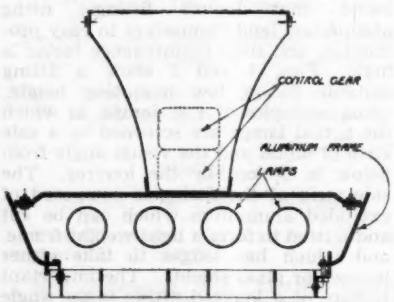


Fig. 2. Cross-section of fitting shown in Fig. 1.

generally better proportions than the larger lamps, but the weight is very much greater in ratio to the light output, and their use will depend, among other things, on the structural proportions of the showroom.

Stores need general lighting, plus highlights, and to allow for these fittings of the type shown in Fig 3 are being tried out. These use the new reflector flood-lamp to give direction of "punch." The different colour of the light source is not a detraction to their use, and so far the results obtained have been very pleasing.

The present period is proving a testing time for what will be installed when the relaxation of controls permits the rebuilding of not only the stores lost through enemy action but also those whose design has fallen beneath the taste of public requirements. It is essential, therefore, that we use the times to the best advantage, and that the fullest direct co-operation is used between the various manufacturers of light sources and their ultimate users.

What have we learnt so far? First, that the fluorescent lamps give us the means of lighting stores as they should be lighted. Secondly, that the whole building *must* be tackled as one problem. Thirdly, that the colour of the surroundings are an important feature of the lighting design. Fourthly, that where the new medium has been installed increased trading has resulted. (Increases of 50 per cent. in trading, which was considered due to the relighting,

have been reported by highly critical merchandising men.) Lastly, it has been found that the greater number of average customers like fluorescent lighting and find it extremely beneficial to shop by.

Future Lighting Ideals

To forecast the future is always a risky experiment, and in lighting we cannot use the age-old formulae of "a tall dark man" or "a long journey" to those who wish to cross our palms with cupro-nickel, but undoubtedly lighting design is going on a long journey into an era in which the whole scheme is co-ordinated with building design to a degree never attempted before.

How far we can go will be, to a great extent, tied up with the price of electricity. If this rises in any great degree then the economics of store operation will insist that the most *efficient* scheme be installed, whereas cheap electricity will allow the more artistic and attractive designs to be used.

For a scheme to look "right" it must provide the proper balance between light and shade, and even between the different brightnesses or, as the Americans call it, "brightness pattern." This ensures that the right emphasis is given in its correct proportions without any detrimental effect to the surroundings. How this will be carried out will depend largely on the individual requirements of each building, but in all cases it will mean a breaking down of our total light output into smaller units, distributed over the whole area. As the large multi-kilowatt radiator gave way to the low-temperature tubular heater, placed where it was most needed, so will lighting utilisation be broken up to provide light where it is most needed.

This can be done by the use of counter lighting, wall niches, top of wall fixtures, light on ceiling, light from ceiling, the best effects being obtained when the light source is completely invisible and only the result seen by the occupant. All-over louvred ceilings are becoming fashionable in America at the present time, but seem to be more in keeping with the cheaper class of business and the small shops. Their adoption over large areas would tend to be monotonous and suffer from having the ceiling too bright in relation to the balance of the showroom. Sectional louvred ceilings will be of more use in providing light and shade and also helping to break up large surface areas.

Use of individual control louvres in directional light fittings must be aimed at eliminating the view of light sources, with the possible exception of where this may be required to give character to a showroom. In such cases a suitable fitting giving indirect or semi-indirect lighting could be employed, its main function being to provide a focal point for the eye and at the same time eliminate any bright spots on the ceiling caused by recessed spotlights.

The building construction should be designed to suit the lighting, and not so much the reverse as has been the practice in the past. For example, flat ceiling

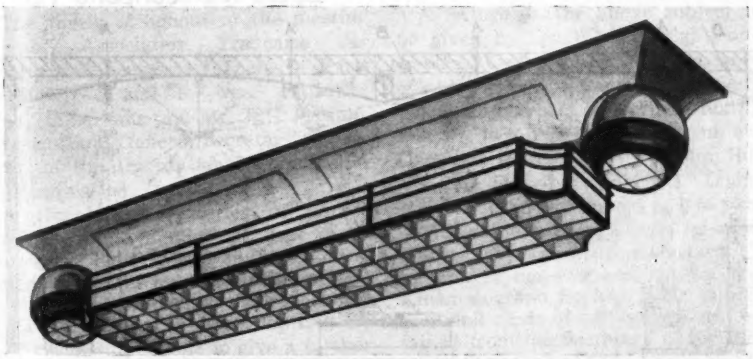


Fig. 3. Composite type fitting using fluorescent lamps together with reflector spot lamps in end focusing units.

Fig. 4. Showing harmony in design. Adaptation of fitting shown in Fig. 3 (Pt.II) to suit exclusive gown salon.

surfaces should give way to concave; light distribution is essentially in circles and future designs of buildings should recognise that. With a store, the customer goes to buy, and correct lighting of the merchandise is more important than all architectural novelties.

Fig. 5 shows the suggested treatment of a ground-floor showroom; in this the ceiling is slightly concave, to be in conformity with light distribution, and the space provided next to the beams is used for conduits, air ducts, cash tube pipes, etc. The lighting is by suspension fittings, giving upward light for the ceiling, whilst the amount of downward light from these fittings is varied to suit the atmosphere required. Emphasis lighting is by means of reflector flood lamps, in recessed fittings of an eye-ball type, in the ceiling. These fittings will have control louvres to cut out spilt light. Counters and wall cases are illuminated, as is the top of the wall fixture, this light having a twofold use, first to show up any merchandise displayed and secondly to soften the shadows cast by the angle of cut-off of the centre fitting. Where providing emphasis lighting from ceilings or high levels, the angle of the beam should be such that viewers do not cast shadows on the merchandise they are looking at.

Light must be an aid to selling, and every piece of merchandise, whether it is a hat in the millinery department or a joint of meat in the provision section, must look *attractive*. Most people view life through rose-coloured spectacles, and to take these away would make life very uninteresting.

With regard to shop window lighting, this will have to take on the mantle of miniature stage lighting; cyclorama backgrounds and coloured effects will all be needed in the future store. The

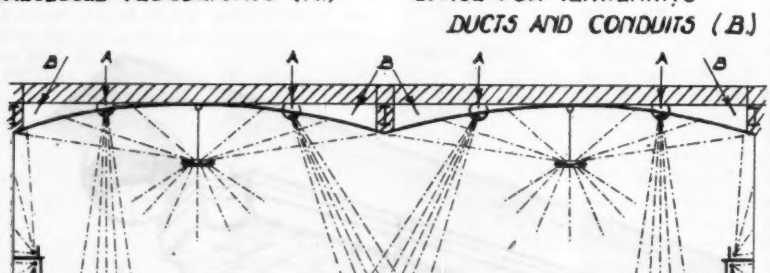


Fig. 5. Suggested scheme for section of a ground floor showroom.

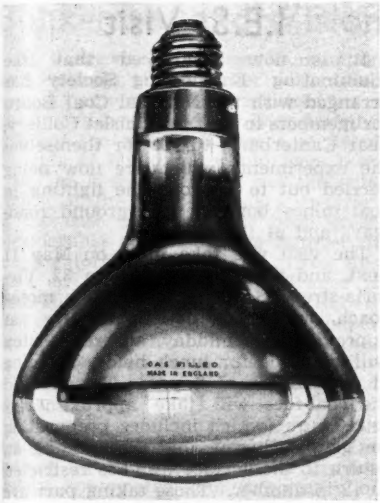


Fig. 6. Internally mirrored reflector spot lamp.

character of windows changes more quickly than the interior, and the utmost flexibility must be provided. Overall schemes, using fluorescent lamps, will be flat, and their use should be restricted to background illumination. Display is essentially a field of individualism, and all possible help can be given by enabling the moods of the moment to be correctly expressed with light.

Experiments are being carried out in what may become the cheapest and cleanest method of heating stores, i.e., the use of infra red lamps with mirrored glass bulbs to provide personal heating instead of space heating. This will form a fresh field for lighting development, and interchangeability of lighting flood lamps in summer with heating lamps in winter is a possibility that is being increasingly examined at the present time.

Conclusion

Enough has been shown in these three articles to indicate that store lighting is not merely a matter of calculating the required foot candles and hanging up any kind of fitting at random. That is what has been wrong in the past, and there is every indication that the past haphazard sale of "fittings" to stores is reaping its full reward. As stores have to cater for the public and have, in fact, been built up on customer confidence, so must the manufacturer of lighting fittings study more closely the individual characteristics of each and every lighting customer. With close co-operation between manufacturers and users there is no doubt that this country can have a standard of store illumination that will surpass all others.

Association Francaise des Eclairagistes

The guests of honour at the meeting of the Association Française des Eclairagistes, which was held in Paris on March 5 and 6, were Professor N. A. Halbertsma and Mr. J. S. Preston, President and General Secretary respectively of the International Commission on Illumination.

A comprehensive series of papers dealing with a number of aspects of fluorescent lighting and public lighting were given at the meeting, including one by Mr. J. M. Waldram on the importance of road brightness in street lighting.

It is hoped to be able to give a further account of the meeting in a subsequent issue.

Colour Vision and the Film Industry

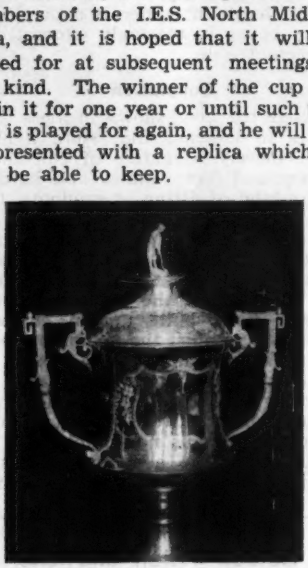
A lecture on the above subject is to be given by Dr. W. D. Wright, of the Imperial College of Science at a meeting of the British Kinematograph Society, which is to be held on April 14 next. The meeting is to be held at 7.15 p.m. at the Gaumont British Theatre, Film House, Wardour Street, London, W.1. Light refreshments will be served at 6.45 p.m.

This subject will no doubt be of great interest to a number of readers. Admission of non-members of the British Kinematograph Society is by invitation only and cards of admission may be obtained from the Secretary of the B.K.S., Dean House, 2, Dean Street, London, W.1.

I.E.S. Summer Meeting

An interesting social item which has been organised in connection with the I.E.S. Summer Meeting is the golf competition for the Dow Cup, the final round of which will be played off at Harrogate during the Summer Meeting.

The Dow Cup, a photograph of which appears below, has been presented by members of the I.E.S. North Midland Area, and it is hoped that it will be played for at subsequent meetings of this kind. The winner of the cup will retain it for one year or until such time as it is played for again, and he will also be presented with a replica which he will be able to keep.



The competition is open to any amateur golfer associated with the I.E.S. provided that he has a handicap of 24 or less. Qualifying rounds must be played by Saturday, June 12. All scores in the qualifying rounds must be recorded on special cards which may be obtained, on payment of 2s. 6d. for each card, from Mr. A. Kelso, Hon. Secretary Golf Committee, Municipal Offices, Harrogate, Yorks; from the Secretary of the I.E.S.; or from the Hon. Secretaries of I.E.S. Centres and Groups. Completed cards should be returned direct to Mr. Kelso within 24 hours of the completion of the round. The full rules for the competition are given on the cards. Each player may submit any number of cards. The proceeds of the competition will be allocated to charity.

I.E.S. Visit

It is now announced that the Illuminating Engineering Society has arranged with the National Coal Board for members to visit the Chislet Colliery, near Canterbury, to see for themselves the experiments which are now being carried out to improve the lighting in coal mines both in underground roadways and at the coal-face.

The visit will take place on May 11 next, and the party will leave 32, Victoria-street, S.W.1, at 9 a.m., by motor coach, arriving at Canterbury at approximately midday, where a stop will be made for lunch before arriving at the colliery at 2 p.m. The visit to the coal-face will take approximately four hours (which includes preparation for going below ground and bathing on return to the surface), and is restricted to 12 in number. Those taking part are advised to wear old clothes and boots and should also take soap and towel.

In view of the importance of the question of mine lighting, to which frequent reference has been made in these columns and in the Transactions of the I.E.S., it is hoped that following this visit an informal meeting may be arranged by the I.E.S. at which individual members taking part in the visit will be able to discuss various aspects of the problems involved in mine lighting for the benefit of other I.E.S. members.

As there will be an additional 15 places in the motor coach it is thought that other members or friends of those taking part in the visit may wish to take the opportunity of either visiting the surface workings of the mine with a trip to the shaft bottom, which is equipped with fluorescent lighting, or alternatively spending a few hours in Canterbury.

Members wishing to take part in the visit should notify the Secretary of the I.E.S. as soon as possible, indicating whether they wish: (a) to be one of the party visiting the coal-face and whether they would be prepared to take part in the suggested informal meeting; (b) to visit the surface workings only; or (c) to visit Canterbury only. To cover the cost of the coach a charge of 15s. 6d. will be made for each person taking part.

Blink-rate and Vision

At a recent lecture on illumination and eyesight, the speaker was asked how the amount of light required for a given task was decided. It is doubtful whether the answer "from a study of the rate of blinking" would have been taken as a serious reply, yet the suitability of the blink-rate as a criterion of the ease of seeing has been given considerable attention by a number of investigators. It is, in fact, from this point of view that its significance is generally discussed, but, as Dr. Robert W. Lawson points out in a recent paper to "Nature," there may be further applications which could considerably affect many other phases of human activity.

In an interesting summary of the available literature on this subject, Dr. Lawson stresses an aspect which is not widely appreciated—the importance of the complete black-out which occurs during each blink. On the average, he says, there is a complete black-out for a period of approximately 0.3 seconds during each full blink. Taking into account the fact that the average pause between blinks is about 2.8 seconds, this means that under normal conditions the average person is blacked out for about 11 per cent. of the total time of vision.

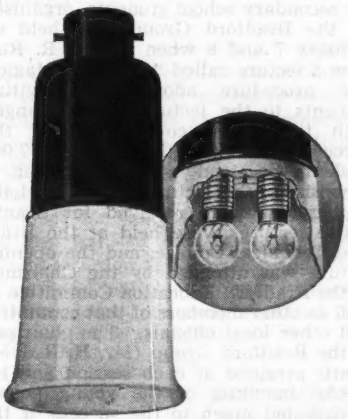
A rapid rate of blinking may thus be a serious handicap in certain occupations. In experiments where a number of events of very short duration have to be observed, as in the counting of scintillations in radioactivity, results may often be in error, or where the coincidence method of measurement is used, individual coincidences may remain unobserved should they occur during the black-out period of a blink.

It is possible that a motorist with a rapid blink-rate could be blacked out intermittently for as much as 40 per cent. of his driving time, or of the distance travelled, and to this might be attributed a primary cause of proneness to accident. In fast games, like tennis or squash, the ball will be lost to view during the 0.3 seconds in which the eyelids are obscuring vision, and on this basis it seems that a player's success could be directly related to his blink-rate!

There is, of course, no conscious interruption of vision due to blinking, and it seems that Dr. Lawson rather underestimates the importance of the "persistence of vision," with which nature has made adequate provision against the "black-out." Even where rapidly moving objects have to be observed, to a large extent compensation is afforded by the movements of the eyes themselves.

Transformer Lights

The Genalex Transformer Light shown below can be plugged into any B.C. lampholder on 200-250 v. A.C. supply, and has been specially designed by the G.E.C., Ltd., for use anywhere where a comparatively dim light is required, either occasionally or continuously. In many cases they can replace 15- or even 25-watt lamps. They consist of small low-loss (true wound) transformer in a moulded plastic case and carry either one or two 6.2-v. 0.3-amp. bulbs. For one unit of electricity the single bulb model burns for approximately 600 hours and the twin-light model for 300 hours.



Birmingham I.E.S. Centre

We are informed by the Birmingham Centre of the I.E.S. that their 1948-49 programme will include an exhibition of recent developments in lighting equipment. In view of the limited space available, those wishing to enter exhibits should apply to the Hon. Sec. of the Birmingham Centre, Mr. W. J. P. Watson, 91, Brandwood Road, King's Heath, Birmingham, 14, for full details as soon as possible.

I.E.S. Centre Activities

Bath and Bristol Centre

In a talk to the Bath and Bristol Centre on February 6, Mr. Anthony Palin, who is Honorary Surgeon to the Bristol Eye Hospital and head of the Department of Ophthalmology at Bristol University, made particular reference to the hindrance to vision from intermittent and flickering light sources, from glare and from insufficient illumination. It was stated that these and other extraneous effects, though being a prolific cause of "optical fatigue" (a term preferred by the speaker to the more commonly used "eye strain"), do not, in fact, cause damage to the eye itself.

Some errors and diseases of the eye and the surgical and opthalmic methods of treatment were briefly discussed, and the lecturer also carried out tests for colour blindness amongst the audience.

Bradford Group

The third series of Christmas lectures for secondary school students, organised by the Bradford Group, was held on January 7 and 8 when Mr. H. R. Ruff gave a lecture called "Rainbow Magic." The procedure adopted in inviting students to the lectures was arranged with the active co-operation of the Director of Education. Over 7,000 students received a leaflet giving a synopsis of the lecture and some 1,400 applications were received for tickets.

The lectures were held at the Bradford Technical College, and the opening lecture was attended by the Chairman of the Bradford Education Committee as well as other members of that committee and other local officials. The chairman of the Bradford Group (Mr. H. Redvers Pratt) presided at each session and his tactful handling of the young people contributed much to the success of the series. Members of the school teaching staffs were also present at the lectures and expressed their appreciation of the lectures and demonstrations.

Glasgow Centre

At a meeting of the Glasgow Centre on February 19, Mr. T. S. Jones presented a paper dealing with lighting in the textile industry. The conditions and requirements of the various sections, e.g., spinning, dyeing, warping, weaving, etc., of textile manufacture were reviewed and the author discussed the particular factors which had to be taken into account in regard to the type of fittings used and the quality and quantity of illumination necessary. The value of good lighting as a means of improving production by the elimination of faults was stressed and the psychological effects of lighting and colour were also considered.

The discussion on the paper was opened by Mr. A. MacGregor, who was followed by a number of other members and visitors.

Leeds Centre

At the February meeting of the Leeds Centre a talk on Mine Lighting was given by Mr. S. W. Richards before an audience which included members of the Midland Institute of Mining, the Association of Supervising Electrical Engineers, the Mines Department of Leeds University, and representatives of the National Coal Board.

In dealing with roadway lighting the author said that it was a debatable point whether fluorescent lamps should be placed axially along the road or at right angles across the heading. Placed across the heading the fittings would give the maximum light up and down the heading but would give the appearance of a ladder of light and might also be objectionable from the point of view of glare. This would be avoided by siting lamps axially when with white-washed walls and roof an even distribution of light could be obtained.

In lighting the coal face itself there were many difficulties to be faced. In the first place it was necessary to provide a mobile lighting system which could be moved forwards with the advancing face. Mounting heights vary with the seam thickness and there was also the problem of the high absorption of light by the coal face and surroundings. Attention must also be given to the danger of explosion which demanded, in the large majority of cases, flameproof fittings.

The author described recent experimental installations and said that coal face lighting in one form or another had undoubtedly come to stay. Experiments would no doubt show which were the best methods to employ, but he thought it very probable that no universal method would be completely satisfactory and that certain compromise would have to be considered.

The EDITOR Replies

The reference in our January issue (page 23) to the new "*For Hire*" illuminated notices now being mounted on the roofs of some *taxicabs* has brought me a letter from Mr. C. E. Masterman, enclosing a copy of an article by him on this subject contributed some years ago to *Modern Transport*.

The need for some effective indication that a distant taxicab is free to receive a fare, which was being stressed even at that time, seems now to be in process of being ultimately satisfied. In the contribution referred to, however, another equally important requirement was emphasised, i.e., the desirability of *some sign*, clearly visible at night, *that a cab is wanted at some particular spot* —for example, at the entrance to some building where people are dispersing. Such a device would enable many cruising cabs to pick up passengers whom they miss at present, and would save those in search of cabs from such fruitless antics as handkerchief-waving and the like. Is it too much to ask the powers that be to authorise the use of some appropriate illuminated signal to meet this special case?

The recent paper read before the I.E.S. by Mr. G. Grenfell Baines was full of interesting matter and has brought me several comments. Is it possible, as was suggested in the discussion, *to relate the size of fittings to the dimensions of the rooms* in which they are installed? No doubt one could not be too definite, but it should surely be possible to give *some idea* of what is desirable.

The problem, however, reminds one of others which are based on feeling. Architects, for example, have no difficulty in recognising a "room of noble proportions" when they enter it. But how many would be prepared to suggest a formula relating height to length and breadth and guaranteed to ensure "nobility"?

On another point—the recognition that *artificial lighting* should be planned on its merits and *not merely to simulate daylight*—there was general agreement. The author confessed a general dislike of artificial windows, though Dr. Walsh contended that in certain instances, corridors for example, they may afford the best solution of a lighting problem. I must own, too, that I have no objection to overhead laylights or luminous panels, provided they are well designed and adapted to the architecture.

There is, of course, much in daylight, its diffusion and soft shadows, for instance, that one wishes to reproduce in much artificial lighting. The essential point, as it seems to me, is to secure the good features of daylight, without perpetuating its weaknesses—of which there are many.

Perhaps the most curious misconception, based on experience of unilateral natural lighting in classrooms,

is that "*light should come from the left.*" In rooms with windows on one side only, where one has to be content with light coming from one direction, it is best, for the benefit of normal right-handed people, that such light should come from the left, thus avoiding awkward shadows of the hand when writing. But this course is recommended only *faute de mieux*. If one can get *well diffused light coming from all directions*, as one readily can do with a well-designed system of artificial lighting, this is ever so much better. Yet I have heard of people so obsessed with the fetish of "light coming from the left" that they have seriously advised lighting of school-rooms from artificial windows on the left only—thus deliberately imitating the lack of uniformity and other weaknesses of unilateral natural lighting. "Artificial side windows" may be adopted for decorative effect or (as indicated above) to solve some special lighting problem, but, even so, the opportunities for their use are limited.

Obituary

H. O. DAVIES

We learn with great regret of the death, on February 17, of Mr. H. O. Davies who, since 1936, served as secretary of the Association of Public Lighting Engineers and was well known in the lighting industry. Mr. Davies combined with a pleasant and sympathetic disposition considerable gifts for organisation and a characteristic thoroughness and conscientiousness in all he undertook. He was largely responsible for many successful conferences and exhibitions run annually by the A.P.L.E., which prospered greatly during his term of office. The Association has lost an able secretary and warm supporter whose place will surely be hard to fill.